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ABSTRACT

Investigated are the multidimensional differences in freshman perceptions and experience of the academic and nonacademic aspects of college associated with varying amounts of informal contact with faculty. Discriminant analysis indicated that factor dimensions, termed Interest Value and Practical Appeal, best distinguished between groups of freshman categorized as high, moderate, and low interactors. High and moderate interactors were characterized by more positive ratings of their academic program on both dimensions and by more positive ratings of their nonacademic life on Interest Value than were low interactors. Academic achievement, as measured by cumulative freshman grade-point average, contributed little to discrimination among the three groups. Analysis of supplementary data also indicated that high interactors ranked faculty members significantly higher as a source of positive influence on both their intellectual and personal development than did low interactors. Moreover, in a follow-up analysis of the same subjects conducted during the subsequent academic year, amount of informal contact with faculty was found to be significantly associated with persistence at the institution. No statistically reliable differences were noted between high, moderate, and low interactors with respect to academic aptitude, personality, dimensions, or initial expectations of the college climate. (Author)

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THE RELATION OF FRESHMAN STUDENTS' SOCIAL AND ACADEMIC INTEGRATION TO ATTRITION

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THE RELATION OF FRESHMAN STUDENTS' SOCIAL AND ACADEMIC INTEGRATION TO ATTRITION

Recent increases in the costs of higher education and projections of a decline in the number of college-age persons during the 1980's have served only to exacerbate institutional concerns about the nature and remedies of student attrition, especially in the private sector, where institutional budgets are so closely tied to enrollment levels. Efforts to understand this phenomenon and to reduce the misexpenditures of personal and institutional resources which attend it have spawned an extensive, if uneven, literature on the nature and sources of attrition.

Spady (1970) and Tinto (1975) provide representative surveys of this literature, and both authors note the feast of descriptive studies of attrition, but the comparative famine of conceptual frameworks to explain it. It seems clear, as both these authors concluded, that little is to be gained by additional descriptive, theory-less research employing univariate statistical procedures to investigate a problem one senses intuitively is a multidimensional phenomenon.

Tinto (1975) has offered a model, adopted for this study, which views attrition as a process related directly to a student's level of integration in both the social and academic systems of an institution. The model seeks to distinguish conceptually among those interactional patterns which lead to varying forms of dropping out normally subsumed under the general rubric of "attrition." It is with the explanatory value of this model, specifically as it relates to voluntary withdrawal, that this paper is concerned.

According to Tinto:

> Given individual characteristics, prior experiences, and commitments, . . . it is the individual's integration into the academic and social systems of the college that most directly relates to his

> continuance in that college. Given prior levels of goal and institutional commitment, it is the person's normative and structural integration into the academic and social systems that lead to new levels of commitment. Other things being equal, the higher the degree of integration of the individual into the college systems, the greater will be his commitment to the specific institution and to the goal of college completion (Tinto, 1975, p. 96).

In addition to failing to base attrition investigations on available sociological or psychological theory, researchers have rarely adopted designs which take into account heterogeneous variable sets. The bulk of the research has been limited to assessments of homogeneous characteristics which may be associated with student attrition. Studies have focused, for example, on personality factors, or on social integration, or on academic involvement, and their relationship to attrition. Much less information is available on the relative potency of one variable set, as compared with another, for explaining student withdrawal. The present study sought to avoid both of these shortcomings.

Specifically, this investigation sought to determine 1) the degree to which a freshman's integration in the social and academic systems of a large, private university is functionally related to voluntary attrition, and 2) the relative potency of these two dimensions for explaining voluntary attrition.

METHODOLOGY

Instrument

If a student is fully integrated in the social and academic systems of an institution, then presumably that individual will have more positive perceptions of those two dimensions of the institutional environment, participate more extensively in social activities, and perform at a higher level of academic achievement than will less fully integrated students.

To assess levels of normative integration in the academic system of the

university, subjects were asked to indicate their perceptions of their academic program; these self-reports were supplemented by each subject's cumulative grade point average, taken directly from students' academic records, at the end of the freshman year. Grade point average is specifically identified by the model as a measure of a student's structural academic integration (Tinto, 1975, p. 92). Assessments of subjects' integration in the social system of the university were made on the basis of their perceptions of their non-academic lives, the number of extracurricular activities in which they reported participation, and the number of times they reported interacting informally with faculty members outside of class for ten minutes or more.

Tinto acknowledges that "interaction with the faculty not only increases social integration and therefore institutional commitment but also increases the individual's academic integration" (Tinto, 1975, p. 109), but he places that variable clearly within the social integration portion of his conceptual scheme (Tinto, 1975, p. 95), and for that reason, the present study treated the amount of students' informal contact with faculty members accordingly.

As a measure of their ratings of their academic program, students were asked to rate the statement "I HAVE FOUND MY ACADEMIC PROGRAM AT S.U. TO BE:" on the Adjective Rating Scale (ARS) (Kelly and Greco, 1975). The ARS was also used by subjects to respond to the statement "I HAVE FOUND MY NON-ACADEMIC LIFE AT S.U. TO BE:." The ARS consists of twenty-four adjectives (e.g., good, enjoyable, demanding, boring, useless, practical, interesting) against which the respondent rates certain statements using the following four-point scale: 1 = extremely, 2 = very, 3 = somewhat, and 4 = not at all. Information on the development, factor analytic studies, and reliability of the ARS is available from the authors upon request.

Additional items on the questionnaire asked students to indicate both the number of times during the spring semester they had met informally with faculty members, outside of class, for ten minutes or more, and the number of organized extracurricular activities in which they had participated during the year.

Sample

A simple random sample of 500 freshmen was drawn by computer from the population of freshmen enrolled in the College of Arts and Sciences at Syracuse University, a large, private university with a total undergraduate enrollment of 10,000 students. The College of Arts and Sciences enrolls approximately half of all entering freshmen. The population from which the sample was drawn was approximately 54 per cent male and 46 per cent female at the beginning of the spring, 1975, semester.

Instruments were distributed by mail in late March of 1975, and usable responses were obtained from 379 subjects, yielding a response rate of 75.8 per cent. The representativeness of the sample was suggested by the relatively high rate of response and a chi-square analysis indicating non-significant differences between the distribution of responding males and females and the distribution of males and females in the population from which the sample was drawn.

In September, 1975, it was determined that 66 of the original sample members had not returned for the start of their sophomore year. Six of these, for academic reasons, had been denied permission to register and were dropped from the analyses as too few in number to treat as a discrete group. Thus, "leavers" in this study were voluntary withdrawals.

A random sample of 60 of the 313 "stayers" was drawn for purposes of making comparisons with the group of "leavers." A series of goodness-of-fit

tests and comparisons of variable means and standard deviations indicated that this sample of 60 stayers was representative of the larger sample from which it was drawn. The remaining 253 stayers were held for use in a cross-validation analysis to be discussed in the next section of this paper.

Analysis

Analysis of the data began with a principal components analysis of subjects' ARS responses. A separate analysis was done for each of the two statements rated. Following Kaiser's (1959) varimax criterion, components with eigenvalues $\geq$ 1.0 were extracted and subjected to varimax rotation. The rotated components will hereafter be referred to as factors.

Mean factor scales were computed by using characteristic variables with rotated loadings of .40 or higher rather than a complete estimation method (in which all variables, regardless of their factor loadings, are used) to increase the internal consistency (alpha) reliability of the individual factor scales (Armor, 1974). Such a procedure, however, may result in the loss of orthogonality and lead to substantial inter-scale correlations. The authors judged that it would be preferable to optimize the internal consistency reliability of each scale despite the potential loss of orthogonality, since the latter situation can be dealt with effectively by employing multivariate procedures which control for the correlations among variables, specifically discriminant analysis.

To determine if the measures of academic and social integration could differentiate, independently of one another, between the groups of stayers and voluntary leavers, the two variable sets were subjected separately to multivariate analysis of variance and to stepwise discriminant analysis. To assess the relative contributions of academic and social integration measures to the separation of leavers and stayers, the combined variable sets were

also employed as predictors in a stepwise discriminant analysis.

Finally, a classification analysis based on the pooled covariance matrix and individual discriminant scores was performed. In this portion of the analyses, the 253 stayers whose scores had not been employed in the derivation of the discriminant function were also classified, as a means of cross-validating the predictive power of the functions obtained.

RESULTS

Factor analysis of students' ARS ratings of their academic program and their ARS ratings of their non-academic life yielded five and four factors, respectively, with eigenvalues greater than 1.0. The compositions of these two sets of factors are shown in Table 1. The alpha (internal consistency reliability) coefficients and the per cent of explained variance accounted for by each factor are also shown. The last factor in each group was excluded from further analyses because of their low alpha reliability or uninterpretability. Each factor has been given a tentative name describing what was believed to be the underlying psychological construct tapped. The reader is cautioned, however, against attributing surplus meaning to the factors beyond the scales which characterize them.

Table 2 displays the means, standard deviations, and univariate analysis of variance F-ratios for each of the ten predictor variables, as well as the multivariate analysis of variance F-ratios, discriminant function chi-square values, and standardized discriminant weights for each of the variable sets when analyzed separately. As the multivariate F-ratios indicate, the academic integration set differentiated significantly between the vectors of means for leavers and stayers at the .01 level, while vectors of means for the two groups on the social integration set were significantly different at the .001

TABLE 1

VARIMAX ROTATED FACTOR LOADINGS FOR STUDENTS' ADJECTIVE RATING SCALE RESPONSES (N=379)*

I HAVE FOUND MY ACADEMIC PROGRAM AT S.U. TO BE:		I HAVE FOUND MY NON-ACADEMIC LIFE AT S.U. TO BE:	
FACTOR	LOADING	FACTOR	LOADING
INTEREST VALUE		INTEREST VALUE	
Enjoyable	.78	Exciting	.84
Exciting	.76	Enjoyable	.81
Stimulating	.74	Good	.78
Enlightening	.71	Interesting	.72
Interesting	.67	Stimulating	.71
Rewarding	.66	Rewarding	.71
Good	.62	Enlightening	.67
Provocative	.58	Boring	-.63
Informative	.54	Worthwhile	.61
Alpha Reliability = .90		Dull	-.60
% Variance = 23.1%		Valuable	.59
DULLNESS APATHY		Provocative	.57
Irrelevant	.75	Alpha Reliability = .94	
Dull	.71	% Variance = 27.7%	
Boring	.66	PRACTICAL APPEAL	
Useless	.65	Irrelevant	-.72
A Waste	.62	Useless	-.71
Alpha Reliability = .85		A Waste	-.70
% Variance 14.1%		Relevant	.63
PRACTICAL APPEAL		Practical	.54
Necessary	.74	Informative	.54
Practical	.60	Necessary	.49
Valuable	.58	Alpha Reliability = .84	
Worthwhile	.51	% Variance = 17.7%	
Relevant	.44	DEMAND/CHALLENGE	
Alpha Reliability = .82		Demanding	.78
% Variance = 11.0%		Challenging	.75
DIFFICULTY/CHALLENGE		Difficult	.74
Demanding	.86	Different	.42
Difficult	.85	Alpha Reliability = .69	
Challenging	.69	% Variance = 9.6%	
Alpha Reliability = .78		UNNAMED	
% Variance = 9.3%		General	.70
UNIQUENESS		% Variance = 5.5%	
General	-.70		
Different	.55		
Alpha Reliability = .27			
% Variance = 4.7%			
Total Variance Explained = 62.2%		Total Variance Explained = 60.5%	

*The complete factor matrix and related information are available upon request.

TABLE 2

MEANS, STANDARD DEVIATIONS, UNIVARIATE F-RATIOS, AMOUNT OF CHANGE IN RAO'S V, AND STANDARDIZED DISCRIMINANT WEIGHTS FOR LEAVERS AND STAYERS ON TEN DEPENDENT VARIABLES, ANALYZED AS SEPARATE SETS

Variable/Set	Stayers (n=60) Mean	S.D.	Leavers (n=60) Mean	S.D.	Univariate F-Ratio (d.f. = 1/118)	Change in Rao's V[a]	Standardized Discriminant Weights[b]
A. Academic Integration Set:							
Interest Value (Acad. Prog.)	2.48	.55	2.83	.46	14.60***	14.54***	-.71
Dullness/Apathy (Acad. Prog.)	3.43	.50	3.19	.55	6.34*	.10	-.13
Practical Appeal (Acad. Prog.)	2.32	.60	2.69	.55	12.56***	1.13	-.44
Difficulty/Challenge (Acad. Prog.)	2.37	.63	2.49	.56	1.16	.51	.16
Cumulative Grade-Point Average	2.45	.72	2.45	.75	.01	.66	-.18
Multivariate F = 3.37, with 5 and 114 degrees of freedom (p<.01)							
Discriminant Function $X^2_{(5)}$ = 15.572, p<.01. Canonical r = .355							
B. Social Integration Set:							
Interest Value (Non-Acad. Life)	2.03	.58	2.36	.59	9.08**	3.85*	.84
Demand/Challenge (Non-Acad. Life)	2.71	.56	3.06	.47	13.23***	11.45***	1.03
Practical Appeal (Non-Acad. Life)	1.79	.51	2.00	.58	4.69*	.13	- .18
Informal Interaction With Faculty	5.75	7.11	2.07	2.65	14.14***	14.14***	-1.22
No. of Extracurricular Activities	1.77	1.72	1.47	2.32	.64	.00	.02
Multivariate F = 5.72, with 5 and 114 degrees of freedom (p<.001)							
Discriminant Function $X^2_{(5)}$ = 25.837, p<.001. Canonical r = .448							

[a] Indicates increase in discrimination attributable to each variable in set. [b] Relative size of weights not comparable between sets.
*p<.05 **p<.01 ***p<.001

NOTE: The ARS is scored from 1 = Extremely to 4 = Not at All. Thus, lower scores are more positive on Interest Value, for example, while the reverse is true on Dullness/Apathy.

level. Because of the intercorrelations among the variables within and between variable sets, the univariate tests of significance are not independent, and therefore the probability statements associated with them are difficult to interpret reliably. Since discriminant analysis takes the correlations among variables into account, the information it provides is more meaningful.

A test of the significance of the discriminant function for the academic integration set (Part A of Table 2) produced a χ^2 value of 15.572 (d.f. = 5, $p<.01$) and a canonical correlation of .355 with group membership. Interest Value in the academic program made the largest change in Rao's V (an index of the amount of incremental discrimination attributable to each variable, given those variables which are already in the equation) and also contributed the most to the discriminating power of the function, as indicated by its standardized discriminant weight. As shown in Table 2, stayers reported having significantly more interest in their academic programs than did leavers. (Recall that the ARS is scored 1 = Extremely, to 4 = Not at all.) The Practical Appeal factor of students' ARS ratings of their academic program also made a contribution to the function, but slightly less than two-thirds as much as the Interest Value factor. Given Tinto's theory, this indicates a significantly higher level of academic integration among stayers than among voluntary leavers. It also appears, from the discriminant weights, that cumulative grade point average does not discriminate meaningfully between the two groups.

The discriminant analysis of the social integration variables set (Part B of Table 2) yielded a function with a χ^2 value of 25.837 (d.f. = 5, $p<.001$) and a canonical correlation coefficient of .448 with group membership. The amount of informal interaction with faculty outside the classroom and the

demand or challenge level found in students' non-academic lives were the principal contributors to the separation between the groups. This is reflected both in the amount of change in Rao's V attributable to each of those variables and in the relative magnitudes of their standardized weights. The Interest Value factor for students' ARS ratings of their non-academic lives made a moderate contribution to the function.

As indicated in Table 2, stayers reported significantly more informal contacts with faculty members and also found their non-academic lives to be significantly more demanding and challenging than did leavers. This finding strongly suggests that stayers, when compared with leavers, were significantly more involved in the social system of the university.

Results of the discriminant analysis of the combined variable sets are shown in Table 3. (In the interest of parsimony and conceptual clarity, only those variables with an F-to-Enter of 1.0 or greater were permitted to enter the equation.) This portion of the analysis indicates the contribution of only the most discriminating variables and permits a simultaneous

TABLE 3

STEPWISE DISCRIMINANT ANALYSIS RESULTS FOR ACADEMIC AND SOCIAL INTEGRATION VARIABLE SETS COMBINED (F-to-ENTER $\geq$ 1.0)

Step	Variable	Change in Rao's V[a]	Standardized Discriminant Weights
1.	Interest Value (Acad. Prog.)	14.54***	- .30
2.	Demand/Challenge (Non-Acad. Life)	10.59***	-1.00
3.	Informal Interaction with Faculty	5.94*	.5[illegible]
4.	Difficulty/Challenge (Acad. Prog.)	2.44	.66
5.	Interest Value (Non-Acad. Life)	2.59	- .56
6.	Practical Appeal (Acad. Prog.)	2.30	- .69
	[Discriminant Function $\chi^2_{(6)}$=32.413, p<.001. Canonical r=.496]		

[a]Indicates increase in discrimination attributable to each variable.
*p<.05 **p<.01 ***p<.001

assessment of the importance of academic and social integration in students' withdrawal decisions. The discriminant function yielded a χ^2 value of 32.413 (d.f. = 6, $p<.001$) and a canonical correlation with group membership of .496. The standardized weights indicate that the Demand/Challenge factor of students' ARS ratings of their non-academic lives is the single most important contributor to the separation of the two groups, followed closely by the amount of informal interaction with faculty members. Notably, cumulative grade point average and the number of extracurricular activities did not enter the equation. Moreover, the correlations between variables of the two sets were modest (range of r = .00 to .36, independent of sign; median r = .20).

To gain some indication of the sharpness of the separation between the groups, and to ascertain the reliability of the discriminant functions, the discriminant scores of the 60 leavers and 60 stayers were subjected to classification analysis. The 253 known "stayers" whose raw scores had not been employed in the derivation of the functions were used as a cross-validation group in the classification analysis.

The academic integration variable set correctly classified slightly more stayers (68.3%) than leavers (65.0%) and 57.3 per cent of the cross-validation group. For the social integration set, the proportions of leavers and stayers correctly classified were roughly reversed, 70.0 per cent of the leavers and 63.6 per cent of the stayers being properly assigned to their group. The social integration variables permitted correct classification of 56.1 per cent of the cross-validation group. Not surprisingly, when the sets were combined, the percentages of all three groups correctly classified were increased: 78.3 per cent of the leavers, 66.7 per cent of the stayers, and 59.3 per cent of the cross-validation group members. In all three instances,

the proportion of cross-validation stayers correctly classified represented significant improvements on chance: for the academic integration variables, $p<.025$; for the social integration measures, $p<.05$; and for the combined sets, $p<.002$.

The questionnaire also asked respondents to rank-order faculty members, academic work, other students and extracurricular activities as sources of positive influence on their intellectual growth and on their personal development. Directional Mann-Whitney U-tests (Hays, 1963, pp. 633-635) for the significance of differences in means for ordinal data showed that stayers ranked faculty members significantly higher as a positive influence on both their intellectual growth ($z = -2.46$, $p<.01$) and on their personal development ($z = -2.77$, $p<.01$) than did leavers. This finding, coupled with the fact that stayers had a significantly higher frequency of informal contact with faculty than did leavers, further tends to support Tinto's view that informal interaction with faculty members is related both to academic and to social integration and consequently, according to the theory, to attrition and retention.

Background characteristics were not included in the design because data on some subjects were incomplete. Supplementary post hoc analyses indicate, however, no statistically reliable differences between leavers and stayers in this study with respect to sex, academic aptitude (as measured by SAT verbal and quantitative scores), or pre-registration expectations of the college environment, as measured by College Characteristics Index (CCI) scores (Stern, 1970). Nor were reliable differences observed between the groups, following a semester and a half in attendance, with respect to their expected major courses of study, their orientations toward college as defined by the Clark-Trow typology (Gottlieb and Hodgkins, 1968), or their primary prefer-

ence of educational goals. Furthermore, a series of canonical correlation analyses indicated that students' ARS ratings of their academic and non-academic experiences were not significantly related at $p < .05$ to either their personality needs, as measured by the Activities Index--AI (Stern, 1970), or their expectations of the institutional environment (CCI). AI and CCI data were available for 242 of the 379 subjects.

DISCUSSION

The results of these analyses, consistent with Tinto's theory of attrition, suggest that social and academic integration are independently--and approximately equally--important in freshman students' decisions to remain or withdraw from an institution. An important implication of this finding is that there appears to be no single area that can be addressed in institutional efforts to reduce substantially the rate of attrition among freshmen. Rather, major "savings" may be realizable only through broadly conceived institutional efforts--strategies which touch both the social and academic environments of an institution.

One such strategy is suggested by the findings 1) that the second largest contributor to the separation of the groups was the amount of students' informal contact with faculty members (the more frequent the contact, the more likely is the student to remain); 2) that stayers ranked faculty members significantly higher than did leavers as a source of positive influence on <u>both</u> their academic and social development; and 3) that informal interaction with faculty correlated somewhat higher with normative academic integration measures (range of $r = .15$ to .36, independent of sign) than with normative social dimensions (range = .07 to .14).

These results point to what appears to be a critical role for faculty

members in facilitating the integration of students into both the social and academic systems of an institution. Although Tinto's theory specifies a key role for faculty in integrating students into the institution's social systems, the findings of this study imply that informal interaction with faculty may be at least as important to the normative academic integration of students as to their social integration. This position is supported by the results of an earlier study (Pascarella & Terenzini, 1975). Students who interacted more frequently than their peers with faculty members had more positive perceptions of both their academic programs and non-academic lives and rated faculty higher as a source of positive influence on both their personal and intellectual growth. These salutary benefits, moreover, appeared to accrue to students with a wide range of backgrounds, academic aptitudes, educational goals, personality characteristics, and expectations of college.

This investigation cannot demonstrate the utility of Tinto's model for studying attrition at schools smaller than Syracuse University, but the conceptual framework has intuitive merit for guiding future research on attrition at higher educational institutions of all sizes. On the basis of the findings reported here, attacking attrition as a behavioral outcome of students' non-integration in both social and academic spheres would appear to be profitable from both research and policy perspectives.

This study highlights at least one area amenable to institutional policy influence--the amount of informal contact students have with faculty members. Institutional policies or procedures which promote such interaction need to be identified and strengthened. Those which impede such contact should be altered. Faculty reward systems might be reviewed and amended, where necessary, to encourage more frequent informal faculty contact with students and to reward it when it does occur. Small sums of money might be earmarked

to help faculty members defray the costs of entertaining students in their homes. Whatever strategies are ultimately adopted, however, the results of this study suggest that students' social and academic integration into the institution are likely to be increased through interaction with faculty and the chances of a student's dropping out correspondingly reduced.

Indeed, the policies, practices, and programs of a wide range of institutional offices might be reviewed to identify those which promote or hinder students' sense of belonging. Wherever and whenever students can be more fully involved in the life of an institution, the likelihood of their remaining will be enhanced. And given the shrinking applicant pool likely to confront most institutions of higher education in the future, policies aimed at retaining students may be much more cost-effective than seeking replacements for the students who come and then leave.

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